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Mathematische Schriften, 7th Ser., Vol. 1. By G. W. Leibniz; edited by Eberhard Knobloch and Walter S. Contro. Berlin (Akademie-Verlag). 1990. 954 + xxxix pp.

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Leibniz produced a staggering amount of work in such areas as philosophy, law, mathematics, logic, history, linguistics, mechanics, physics, astronomy, and theology. The present collection gives some indication as to the scope of his contributions. It is just the first volume in the Leibniz-Archiv (Hannover) project to produce all of Leibniz's mathematical writing. Its nearly one thousand pages represent his writings on certain mathematical subjects during the four years from 1672 to 1676 which Leibniz, then in his twenties, spent in Paris. (Note that this does not include the extensive body of Leibniz's work on the calculus.) Leibniz was the paradigmatic example of genius during a century which Whitehead called the "century of genius" [1889, p. viii]. While Leibniz always claimed that logic was the foundation of all of his ideas from theology to mathematics, he had few other logicians with whom he could discuss or debate his logic (the "universal characteristic"). In most other areas of research, however, this was far from the case. Leibniz may have been isolated as a logician, but as a mathematician he worked amid a host of mathematical giants: Pascal, Descartes, Sturm, Goldbach, Wallis, Fermat, Tschirnhaus, Newton, Huygens, the Bernoullis.

This volume of his mathematical writings is divided into three sections consisting of 34 pieces on geometry, 70 on number theory, and 42 on algebra. In the geometrical studies, Leibniz produced several papers on Euclidean, solid, and spherical geometry. In addition, there are several pieces here in which Leibniz deals with a variety of construction problems. In most cases, these are problems met with in the works of other mathematicians (Descartes, Huygens, Pappus, Ozanam, Buot, etc.). Finally, there are a few studies dealing with methods for the determination of the areas of various types of polygons.

Nearly half of the material collected here comes from Leibniz's number-theoretic correspondence, marginalia, and other manuscripts. Some of the problems he tackled were posed by Ozanam. For example, Leibniz found seven independent solutions (see No. 47, p. 266) to the problem of finding three numbers with the property that their sum is a quadratic number and their sum squared is a biquadratic number. Leibniz also studied Diophantine equations of the form $x^n + y^n = z^n$ (e.g., No. 35, pp. 213–216; No. 63, pp. 461–462; No. 80, pp. 547–548; No. 98, pp. 630–633). Other problems also captured his attention: for example, finding two numbers which are not relatively prime but whose product is a square (e.g., No. 41, pp. 242–245, and No. 48, pp. 330–336) and searching for a geometric solution to the distribution of prime numbers (No. 36, pp. 217–228). From his work in number theory, Leibniz made a distinction between essential and arbitrary numbers which became important for determinate calculus.

For Leibniz, algebra consisted solely in the attempt to solve equations. Consequently, his work in this area revolved around finding techniques for solving various kinds of equations, among them the transformation of equations and the decomposition of equations in one unknown into two equations in two unknowns. For example, he shows that two second-degree equations in two unknowns result from the decomposition of a fourth-degree equation in one unknown (see No. 129, p. 830).

This book (and its planned companions) should prove to be of immense value to a host of scholars and researchers, not only mathematicians but especially historians of mathematics, Leibniz scholars, historians of science, historians of philosophy, and philosophers of mathematics. The reputation of Leibniz's work on the calculus and the Newton controversy have tended for more than three hundred years to overshadow much of his other mathematical research. This collection, and especially this volume, amply demonstrates Leibniz's abilities in other areas such as geometry, number theory, and algebra. Moreover, much of this earlier mathematical work was foundational to the formation of his ideas on the calculus.

Needless to say, many people are involved in the production of this series. The editors of this particular volume, Eberhard Knobloch and Walter S. Contro, have, in effect, been working on this project for many years. From nearly thirteen hundred manuscripts or manuscript fragments by Leibniz from the Paris period, they have chosen the ones reproduced in this volume as the best representatives of his early mathematical work. Throughout, their organization and editing of each manuscript (each is introduced with a brief summary or explanatory note) have aimed at providing the maximum benefit to researchers. The extensive indices and bibliography are especially useful.

Keeping in mind that all of these papers are in Leibniz's Latin, all scholars who have an access to Latin and who seek a deeper understanding of Leibniz, mathematics, and the history of mathematics now have at hand a valuable research tool.

One cannot close without a word concerning the overall production of this volume. It is, quite simply, beautifully done. The symbolic material and the mathematical diagrams are clear and perspicuous; the printing and binding are exceptionally fine. This presentation befits a book destined to be used for many years to come.

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